

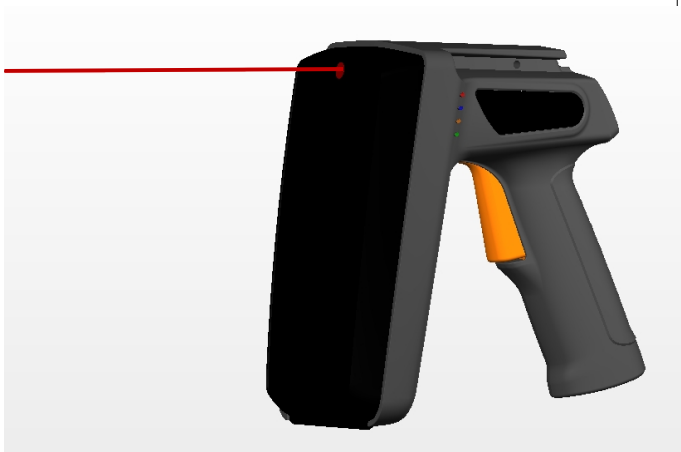
## RFID Handheld Reader – UHF

Model: IP 3225

User Manual



Version 1.00  
24 December 2008  
IP 7070



## IMPORTANT

**Please read instructions before operating this device.**

**Batteries are not charged when you take it out of the box. Only use a charger approved by IPICO.**

**Dispose of used battery or unit properly. Contact your local waste disposal department for information on disposing lithium-ion (Li-ion) batteries.**

**Warranty is void if you open or tamper with this device.**

### Explosive atmospheres

User shall switch off this unit and obey all safety requirements in these areas. This unit may only be operated if the area is declared safe by a safety official. Hazardous areas typically include fuelling areas, below decks on boats, fuel or chemical transfer/storage points, blasting locations and areas where air contains chemicals or particles, such as grain, dust or metal powders.

## NOTICE

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IPICO Inc. shall not be liable for any errors or for incidental or consequential damages in connection with the furnishing, performance or use of this document, hardware and/or software. IPICO's standard terms and conditions apply when using this product.

All information in this document including the design and specification are subject to change without notice for the purpose of product improvement.

For further information contact +27 12 345-9520.

## SAFETY

- Avoid any extended human exposure directly in front of the UHF Reader, up to a distance of 15 cm, when unit is switched on.
- Avoid looking directly into the Laser beam. Class II, <1mW, 650nm Laser.
- In most aircraft and hospitals the use of UHF devices are prohibited. Please consult the local authorities and safety official when operating this device.
- Only qualified personnel may open the unit.

## APPROVALS

FCC Part 15 Class B : **Pending**

EN 300-220-1, 300-220-3, ETS 300-683 and EN 6100-3-2& 3 (CE) : **Pending**

IEC 60950 (CE) : **Pending**

UL 60950/CAN/CSA22.2 No. 60950 : **Pending**

### FCC DECLARATION (USA)

#### FCC Section 15.19

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

#### Information to User (FCC section 15.105)

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

#### Information to User (FCC section 15.21)

The user is cautioned that any changes or modifications not expressly approved by IPICO or authorized representative could void the user's authority to operate the equipment.

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## HISTORY

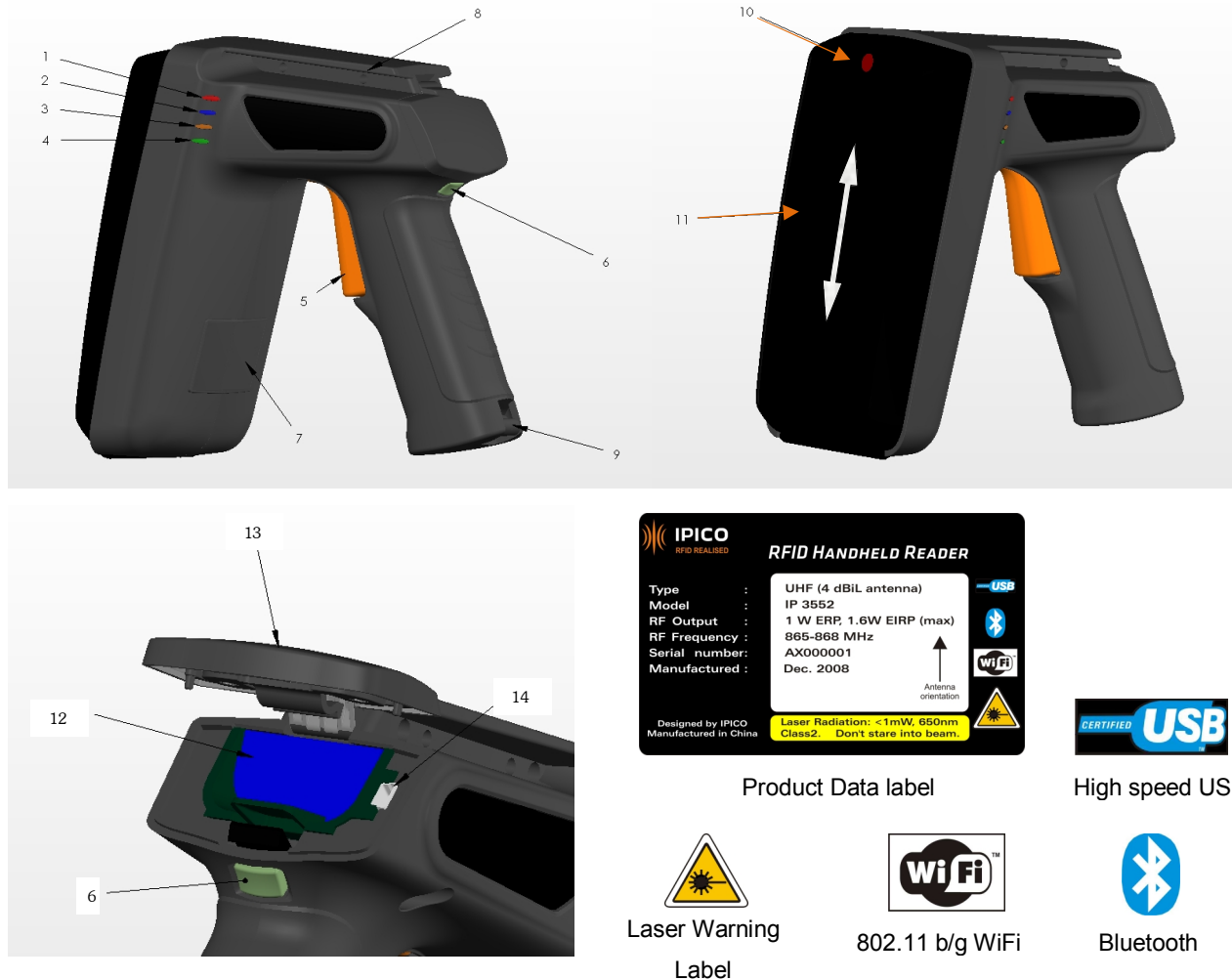
Version	Date	Person	Reason
1.00	24-12-2008	MVD	Created. Release for use.

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## GLOSSARY

dB	Decibels
dBd	Antenna gain in dB relative to dipole antenna
dBi	Antenna gain in dB relative to isotropic antenna
dBil	Antenna gain in dB relative to linearly polarized isotropic antenna
EIRP	Equivalent Isotropic Radiated Power
ERP	Effective Radiated Power (referred to a dipole)
I and Q	Quadrature RF signals (90 deg out of phase)
RFID	Radio Frequency Identification
RFU	Radio Frequency Unit
CW	Continuous Wave
USB	Universal Serial Bus
BT	Bluetooth™
PC	Personal computer
PDA	Personal Digital Assistant: Suggested model Symbol™ PPT8800 Other PDA's will require a different cradle. Check availability.

# 1. Know your reader.

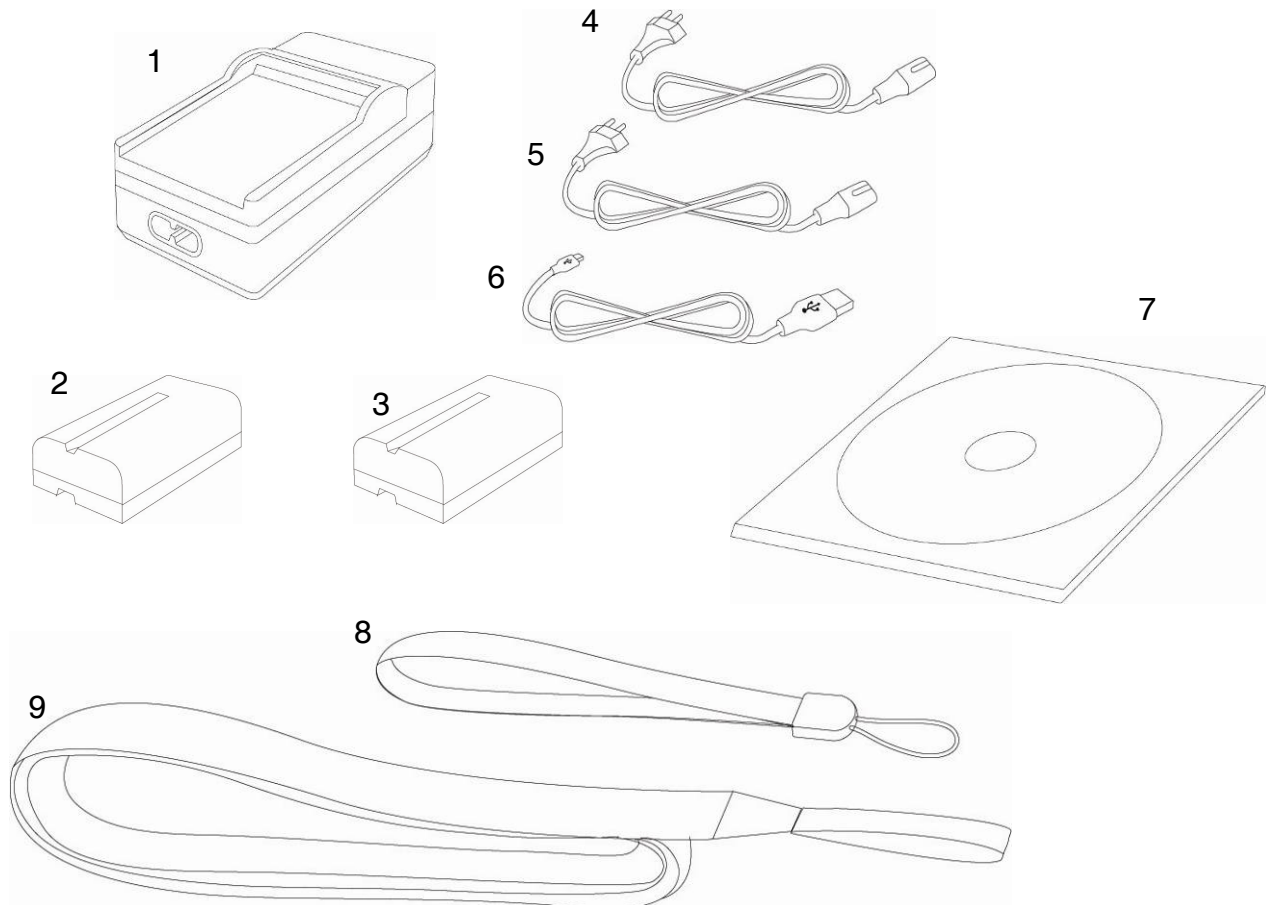


- 1. 'POWER' and 'LOW BAT' LED – Red
- 2. Bluetooth 'Active' LED - Blue
- 3. WiFi 'Active' LED - Amber
- 4. 'VALID ID' and 'HEARTBEAT' LED - Green
- 5. Trigger
- 6. Battery-door release button
- 7. Product Data label

- 8. PDA bracket mounting area
- 9. Shoulder and hand strap attachment pin
- 10. Laser pointer (Class II, <1mW, 650nm)
- 11. Antenna ray dome (Linear polarised antenna)
- 12. Battery (NPF 570 or equivalent)
- 13. Battery door
- 14. USB connector

**Figure 1. Reader overview**

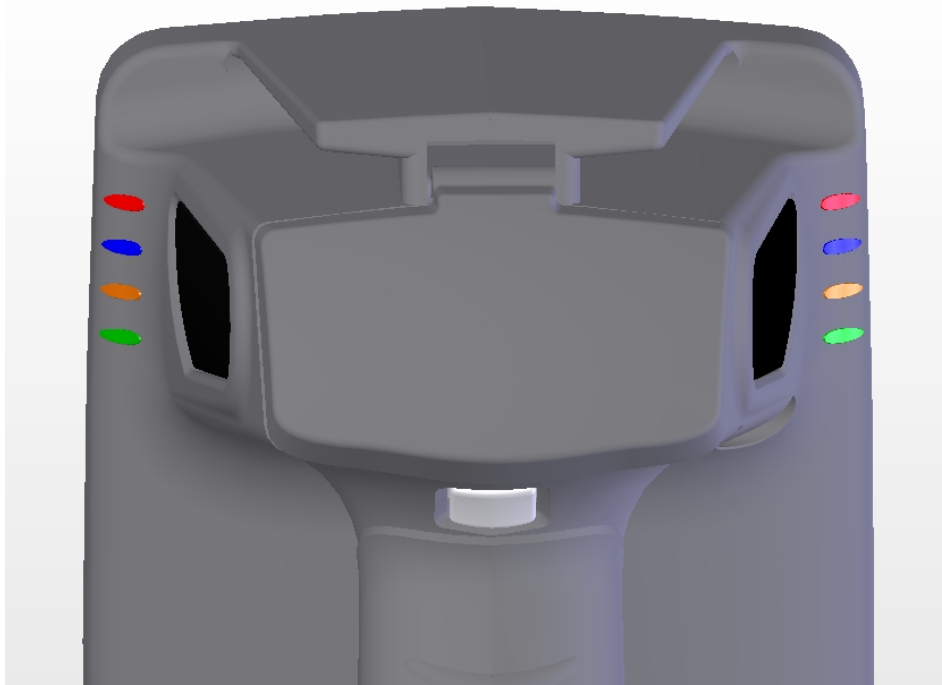
## 1.1 Supplied Accessories



**Figure 2. Accessories**

- |                        |  |
|------------------------|--|
| 1. Battery Charger     | 6. USB cable (Type A to Mini B)                      |
| 2. Main Battery        | 7. Product CD with driver, manuals and Demo software |
| 3. Spare Battery       | 8. Hand strap  |
| 4. USA power cord      | 9. Adjustable Shoulder strap                         |
| 5. European power cord |  |

## 1.2 Status indicators



**Figure 3 Status indicators**

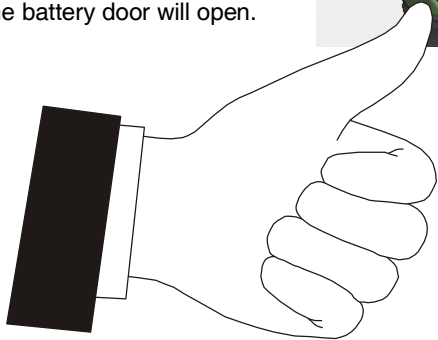
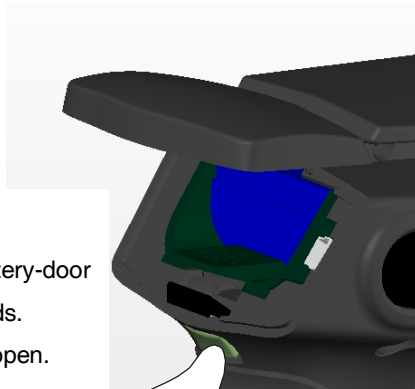
- |                  |   |  |
|------------------|---|--|
| 1. <b>RED</b>    | – | ON reader power ON. PULSE when battery is LOW          |
| 2. <b>BLUE</b>   | – | ON when Bluetooth™ is active                           |
| 3. <b>AMBER</b>  | – | ON when WiFi is active                                 |
| 4. <b>GREEN</b>  | – | Slow PULSE – HEARTBEAT<br>Fast random PULSE – VALID ID |
| 5. <b>BUZZER</b> | – | PULSE on VALID ID                                      |



## 2. How to change the battery

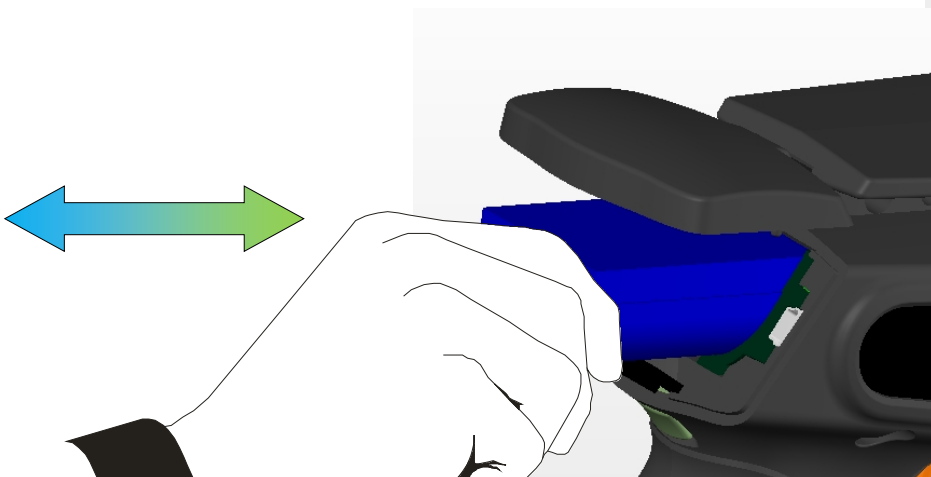
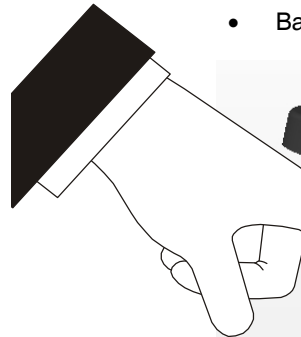
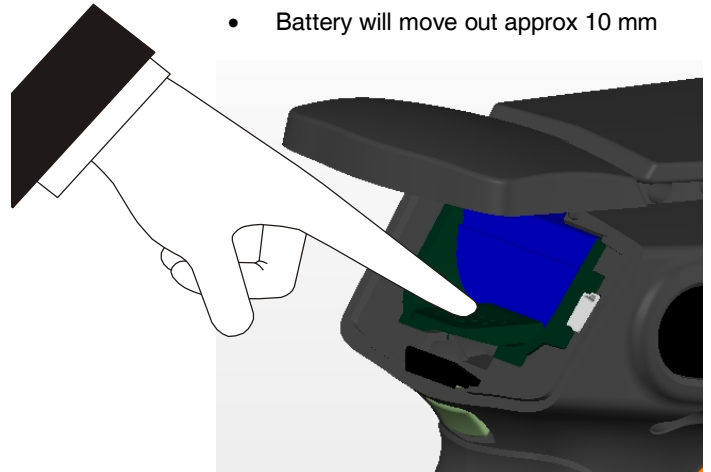
### STEP 1

- Press the Battery-door release button upwards.
- The battery door will open.



### STEP 2

- Press down on the release catch.
- Battery will move out approx 10 mm



### STEP 3

- Grab battery and pull out.
- Insert charged battery. Note battery can only go in one way.
- Push battery in until the release catch engage.
- Close Battery door.

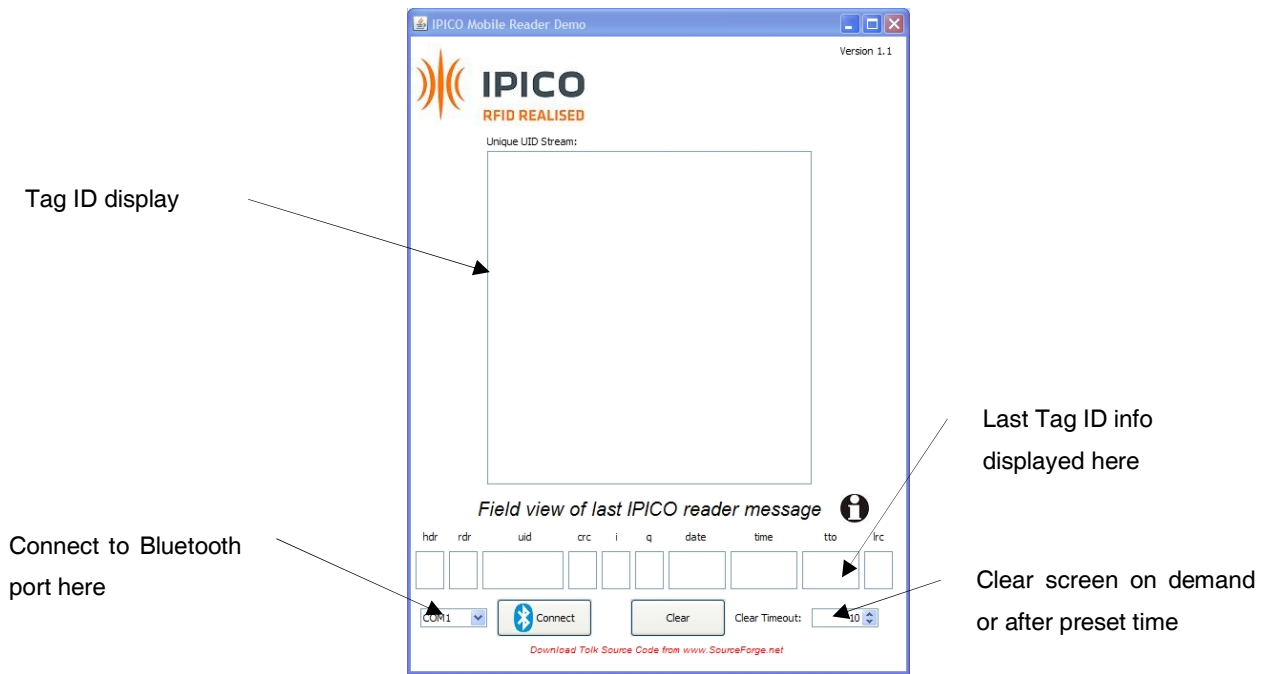
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### 3. Quick start (Handheld reader only)

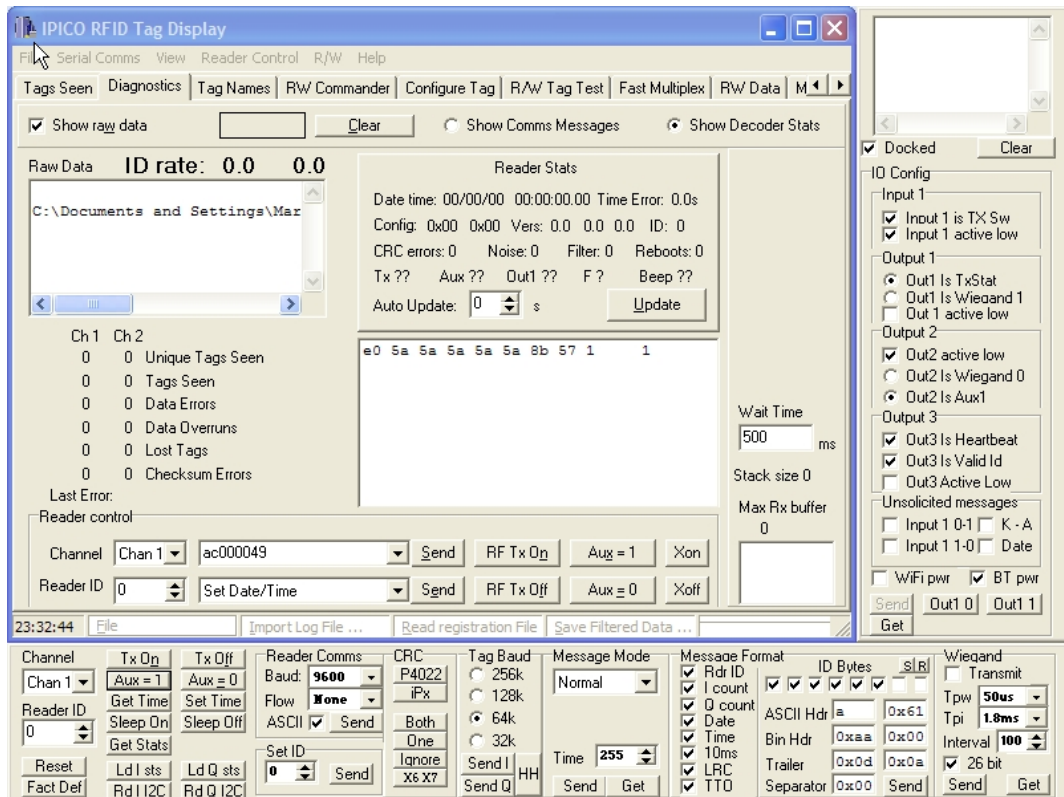
1. Make sure battery is fully charged.
2. Press power switch for 2 seconds. Reader will switch on.
3. Press trigger switch. The laser pointer and RF unit will become active.
4. Point the reader into the general direction of a correctly orientated tag. **Note: The laser pointer may be used as a direction guide only, as the RF radiation pattern is not a pencil beam.**
5. While a tag is in the RF beam, the internal buzzer will pulse for the whole duration until the trigger switch is released.
6. The reader will automatically go into standby mode after 10 minutes if there were no trigger presses. Start from step 2 to repeat the read operation.

### 4. Quick start (Handheld reader connected to PC/PDA via Bluetooth™)

1. Start Bluetooth utility on the host PC or PDA. This BT interface will differ from vendor to vendor. Note: The PDA can be mounted in the cradle provided.
2. Switch reader ON. Scan the BT neighbourhood. The reader will announce it self to the PC as an **IPICO HANDHELD** device (KC Wirefree BT module). The default PIN is **1234**. It is recommended to rename the connection name to a reader specific identifier. The pairing needs to be done only the first time.
3. The BT connection on the host PC will allocate a virtual COM port. This number needs to be used in the RFID application that runs on the PC or PDA.
4. Start the RFID application i.e. Showtags or IPICO Handheld DEMO. Set the serial COM port to the number stated above. The default parameters are 9600, 8, N, 1, N. Open the serial link. (Refer to Showtags manual at <http://ipico.com> or on included CD)



**Figure 4. IPICO Handheld Demo**

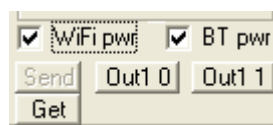


**Figure 5. Showtag's Advanced User interface**

5. Press the trigger and scan a tag(s). The default setting of the reader is “Trigger” mode. The tag ID’s will only be sent to the host once for each trigger press. The reader will still read the tag multiple times during the process. This mode is used to reduce the communication overhead to the host. In “Normal” mode the tag ID’s will continuously stream up to the host as long as the trigger is pressed.
6. The user can send the ‘ac000049’ command to switch the reader OFF or wait 10 min when the reader will turn OFF automatically if there were no activity on the reader side.

## 5. Quick start (Handheld reader connected to PC via WiFi 802.11 b/g)

1. Note: the WiFi is by default OFF and needs to be switched ON by the user. This status can then be saved in the reader. If not saved then the WiFi will be OFF when the reader is switched OFF and ON again. Command ‘ac000027’ will save the last configuration setup in the reader.
2. Start Showtags, the Lantronix utility and Windows Wireless browser on the host PC. Switch reader ON and connect to it using the BT interface.
3. Use the Showtag’s Advance User interface to select the WiFi Pwr checkbox and click ‘Send’ to activate the WiFi on the reader. The Amber LED will be ON.



Using the WiFi will increase the current consumption by 200-600mA.

4. Scan for WiFi devices using the Windows Wireless network browser. The SSID name of the reader is factory set to reflect its serial number i.e. **IPICO HH AX000013**.

- 
5. When the peer to peer link is connected, the user can use the Lantronix browser to connect to the WiPort™ module and reconfigure it. See the included Lantronix Manual for more information or go to [www.lantronix.com/device-networking/embedded-device-servers/wiport.html](http://www.lantronix.com/device-networking/embedded-device-servers/wiport.html).
  6. The default IP address of the WiPort module is 169.254.86.149 Port 10001. The default network mode is set to **Adhoc**, for peer to peer connections with the host. If the reader needs to connect to an access point, the user can reconfigure the WiPort to **Infrastructure** mode. Refer to the Lantronix WiPort™ manual.
  7. Using a static IP address on the PC, the User can connect to the reader using Showtags or a User application.
  8. All other operations are the same as for a BT connected reader. The BT and WiFi connection can be open simultaneously. It is however recommended that one of these devices i.e the BT, stays the primary bi-directional port and the other i.e the WiFi, stays as a 'TX only' port. This will eliminate a condition where the reader receives 2 different commands simultaneously.

## 6. Advance use (Handheld reader connected to PC via USB )

1. Switch the reader ON and connect the USB port. Windows will detect a new device. Install the "Ipico\_HH\_cdc.inf" from the CD (**..USB drivers and info\UHF\_HH\_Files\Virtual Serial Driver**). Windows will now detect an IPICO HH device on the USB port next time it connects again.
2. Any firmware upgraded will be done via the USB connection. A Step by step instruction set on how to do the upgrade will be distributed with each FW release.

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## 7. Operations overview

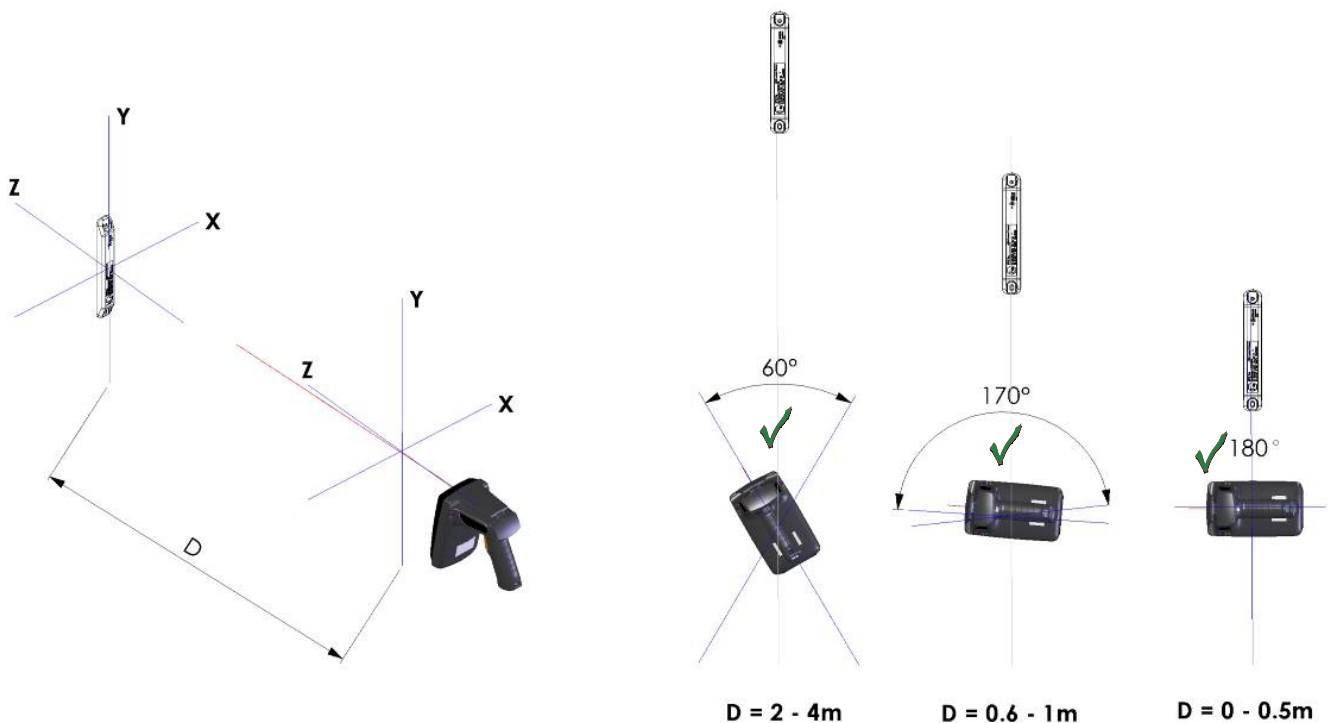
The IPICO reader is designed as a read/write (RW) reader. The reader modulates READ commands to the tags in order to interrogate the tag. Depending on the application new DATA can be updated on the tag using a modulated WRITE command. Read commands will typically be 5ms in duration with a response from the tag in 300us for 64bits. A WRITE command will typically be longer and will average around 35ms.

During a read event, the reader will energise a tag(s) (can be a few milliseconds i.e 7ms), followed by modulating a READ command in order to 'get' DATA from the tag. The reader decode the incoming signal and place a time/date stamp on it, whilst buffering the data temporarily until such time it can be send, on the communication port, to the host. If multiple DATA pages are received from the same tag before the packet is send to the host, a hit counter is increased. This hit count is included in the communication packet to the host. The RF unit down converts the incoming signal and the in-phase signal (I channel) is decoded.

Refer to the instruction set in the serial protocol document – [www.ipico.com](http://www.ipico.com)

## 8. Application notes

1. Some of the IPICO tag antenna formats are dipoles. Like dipoles, they have nulls end-on.
2. Tags should always be orientated for optimal read performance. The operator may find it useful to rotate the handheld reader through 90 degrees in order to read tags that are not orientated in the optimal position.



Note: these are typical read scenarios with an on-metal tag. Application scenarios may differ and will be dependant on tag type, tagged object environment and reader/tag setup.

**Figure 6 Typical Bad and Good read scenarios**

3. Tag data rates/reading speed depends on the tag version used. Please consult iPico's support team or your local dealer regarding these specifications.
4. Up to 30 tags can be read per second. This depends however on the total number of tags present in the reader beam at the same time. The reading speed will reduce when more than 30 tags are present simultaneously.

5. Read ranges in excess of 4.5m are achievable at 1W ERP (1.6 W EIRP), given a fully charged battery, the correct tag and the optimal read environment. i.e. Industrial vehicle tag on a large (typically 1m<sup>2</sup>) metal plate.
6. Readers operating in small confined spaces can interfere with themselves due to unwanted reflections. Please consult IPICO's support team or your local dealer regarding read scenario strategies.
7. The standard dipole tags must be mounted at least 18 mm away from a metallic or conductive surface, fluids and human bodies. The industrial vehicle tag can be mounted directly on metal objects or objects containing fluids. Refer to iPico's range of packaged tags in order to plan an application.
8. Reflections from nearby conducting surfaces and multi-path propagation in particular can lead to deconstructive interference in the reader TX and RX path. Note: Constructive interference due to multi-path will lead to longer read ranges in some cases than what was initially planned for.
9. Adjustable PDA cradles are optional and will be available in Q1 2009. Max size of PDA will typically be 110x150x30mm. Please consult IPICO or your local dealer regarding such option.



## 9. Troubleshooting

### Visual indicator guide

- FLASHING Green indicates valid tag ID's are decoded. When the unit is switched ON the Green LED will typically be ON. As soon as a tag is scanned the Green will FLASH and then stay OFF until the next ID gets decoded.
- Steady RED LED indicates Power ON. Slow FLASH indicates battery voltage low.
- FLASHING BLUE indicates Bluetooth™ connectivity and activity.

Symptom	Possible causes
Red LED Off	Reader switched OFF
	Power source faulty
	Indicator board faulty
	Reader faulty
Blue LED Off but reader decodes tags. (Buzzer active)	BT Communication lost.
	Application software not running
	BT/Reader Baud rate incorrect
Cannot read a tag although Host communicates with the reader.	Transmitter not switched ON. Trigger switch faulty.
	Faulty Tag or incorrect Tag baud rate selection.
	Tag not orientated correctly.
	Faulty Reader front end
	High levels of ambient RF noise operating in the same frequency spectrum as reader.

**Table 1 Troubleshooting guide**

## 10. Maintenance

This is a low maintenance device. The user must make sure that the reader is kept clean and dry where possible. Do not use solvents to clean this unit. This unit is splash proof but not waterproof. Do not use any other charger unit unless authorised by IPICO.

## 11. Technical specification

<b>Power supply requirement</b>	<b>Charger input:</b> 100 - 240 VAC @ ~150mA, 50/60 Hz <b>output:</b> 8.4VDC @ = 600mA <b>Field replaceable Battery :</b> Li-ion 7.2V 2.1Ah (NPF570 type) Charge time: Typically 4 hours (500 charge cycles) Operating time: typically 4-10h ( typ. example 60 000 tags ~ 10tag/s every 5s for 10h) Standby time: typically 250h+ (standby current <3nA)
<b>Transmitter power</b>	Typical 1W ERP max
<b>Operating frequency</b>	USA: 902-928 MHz band; (915.3-921.6) EUR: 865-868 MHz band; (865.7-867.5) South Africa: Fixed Freq at 921 MHz Other: On request.
<b>Antenna type</b>	Internal 4 dBil linearly polarized
<b>Read range</b>	1W ERP: up to 4.5m+ using rail tag mounted on metal back plate (>300mm <sup>2</sup> ) Highly dependant on reader/tag type/tagged object/environment interfaces
<b>Communication</b>	Primary communication: Bluetooth™ Class II or 802.11 b/g Wiport ® Secondary: For maintenance only USB (mini USB type B)
<b>Protocol</b>	IP-X™ and ISO 18000-6 "TOTAL". Compatible with EM4122, EM4123, EM4232, EM4432, EM4444 and EM4445
<b>Data storage</b>	8 M byte for internal program/config memory Circular 16 M byte memory buffer for time/date stamp tag records (typically 250k records)
<b>Indicators</b>	Red LED: Power ON, Flashing = Low Battery Blue LED: Bluetooth connection good Amber LED: WiFi connection good Green LED: Heartbeat and reading valid tags Audible BEEP: Reading valid tags, and 1 min 'Shutdown' reminder Integrated Red laser pointer (<1mW, 650nm)
<b>Reader Controls</b>	Hold Trigger for 2 sec switch reader ON; Trigger press = activates laser pointer and RF to read tags. Auto switch OFF after 10min inactivity.
<b>Reader Modes (set up by host controller)</b>	Normal mode: Reader transmits all received valid codes to host "Trigger" mode: Reader transmits one code only for each different ID received
<b>Electrical interface</b>	Mini USB (type B) connector for firmware maintenance
<b>Environmental</b>	Operating temperature range: -20 to +40 Deg C Storage temperature range: -40 to +85 Deg C Humidity: 5 to 95 % non-condensing IP rating: IP54 UV protection: Yes
<b>Physical</b>	Dimensions: 200mm x 190mm x 110mm (WxHxD) excluding mounting bracket. Weight: Approx. 900grams unpacked including battery Weight: Approx 1.5 Kg Packed for shipping
<b>Accessories</b>	1x Adjustable Shoulder strap 1x Hand strap; 1x CE certified AC Battery Charger 2x Universal adaptor cables for USA, EUR 1x Spare Li-ion battery (NPF570 type) 1x 1m Mini USB cable. 1x Adjustable PDA bracket (under construction – available in Q1 2009)

**Table 2 Technical Specifications**

## 12. Support

### Ordering information

Order Code: **IP 3225**  
Product name: RFID Handheld Reader - UHF  
Part description: IP-X URDR-MOB-LR-rff-rfp-RW

rff = RF Frequency in MHz

Custom frequencies between 840 – 956 MHz on request.

rfp = Radiated Power (fixed at 1W ERP max)

RW = Read/Write and TTO enabled

(TTO mode = Read User Data from tag without reader command modulation – eliminate spectrum pollution)

### Accessories

Adjustable Shoulder strap

Hand strap;

UL/CE certified AC Battery Charger

Universal adaptor cables for USA

Universal adaptor cables for EUR

Li-ion battery (NPF570 type)

1m Mini USB cable.

Adjustable PDA bracket (under construction – available in Q1 2009)

*Please consult your local dealer for more information regarding the accessories and system design*

## 13. Technical Assistance

Support [support@ipico.com](mailto:support@ipico.com)

IPICO online <http://www.ipico.com>

Designed by IPICO

Manufactured in China